National Synchrotron Light Source II

Project Progress Report

April 2010

The Ring Building takes shape, with erection of structural steel progressing rapidly in this photo taken April 30.

report due date:
May 20, 2010

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BROOKHAVEN
NATIONAL LABORATORY

OVERALL ASSESSMENT

The National Synchrotron Light Source II project continues to make excellent progress, and to maintain satisfactory cost and schedule performances.

Unfortunately, one near-miss incident and one recordable injury occurred in late April at the Ring Building construction site. Project management, as well as the DOE BNL site office, promptly heightened safety oversight and immediately conducted an analysis of the near-miss incident. All excavation work at the construction site was shut down until investigation and causal analysis were completed. A report of the analysis to identify root causes has been submitted and corrective actions are being implemented.

Project management clearly conveyed concern to the senior management of the Ring Building contractor, and a monthly assessment to examine all aspects of the contractor's ESH program has been implemented. Although the contractor's safety culture continues to strengthen, Project management will maintain heightened vigilance and safety oversight.

Construction of the Ring Building and central chilled water plant expansion continues to be ahead of schedule. Concrete work picked up pace substantially in April, and structural steel erection continues to advance rapidly. The installation of underground utilities and mobilization of the chilled water piping contractor are well underway.

Progress in all areas of Accelerator Systems continued, maintaining its cost and schedule goals in April. The linac contract was awarded and the evaluation of booster proposals was completed. Production activities for magnets, girders, vacuum system components, power supplies, and electronics continued, and completed components are being delivered and tested. Good progress was made on the design of insertion devices. Preliminary designs for the six project beamlines are also on track for completion by September 2010.

Owing to excellent schedule performance, construction of the Ring Building—which was formerly on the project's critical path between FY09 and FY13—now moves to the near-critical path, with more than one month of schedule float. The projected early completion date for the project remains February 2014, and the new critical path now includes the fabrication and installation, followed by commissioning, of the accelerator systems.

Activities funded by the American Recovery and Reinvestment Act (ARRA) continue on schedule and on budget.

As the project moved into its peak activity phase in 2010, the project calendar for the rest of 2010 is being filled with workshops, design and production readiness reviews, BAT meetings, and advisory committee meetings.

SCHEDULED EVENTS 2010

Beamline Development Workshops (12 planned to date)	April–June
Utility System Design Reviews (2)	June
Radiation Safety Workshop	June 22–23
Final Design Reviews: Electrical Sys. & Power Supplies (3)	May–July
Magnet Production Readiness Reviews (7)	July–Aug.
Beamline Access Team (BAT) meetings (6)	July
Scientific Advisory Cttee. (SAC) Proposal Review mtngs. (7)	July
Timing and Fast Orbit Feedback Workshop	July
Light Sources Directorate SAC meeting	Aug. 12–13
DOE Mini-review of NSLS-II	Aug. 25
NSLS-II Conventional Facilities Advisory Cttee. (CFAC) mtng.	Oct. 5–6
NSLS-II Accelerator Systems Advisory Cttee. (ASAC) mtng.	Oct. 14–15
NSLS-II Prelim. Design Rev. (PDR) of Experimental Facilities	Oct. 19-20
DOE Review of NSLS-II	Nov. 16–18

ACCELERATOR SYSTEMS DIVISION (ASD)

All technical issues with production of storage ring magnets have been resolved and the fabrications of the first article production for all magnet types are making good progress (Fig. 1). The delivery of first article magnets is expected to be delayed by about one month compared to the schedule (Table A). While the overall project schedule has not been impacted, various options to recover this loss of schedule float will be considered.

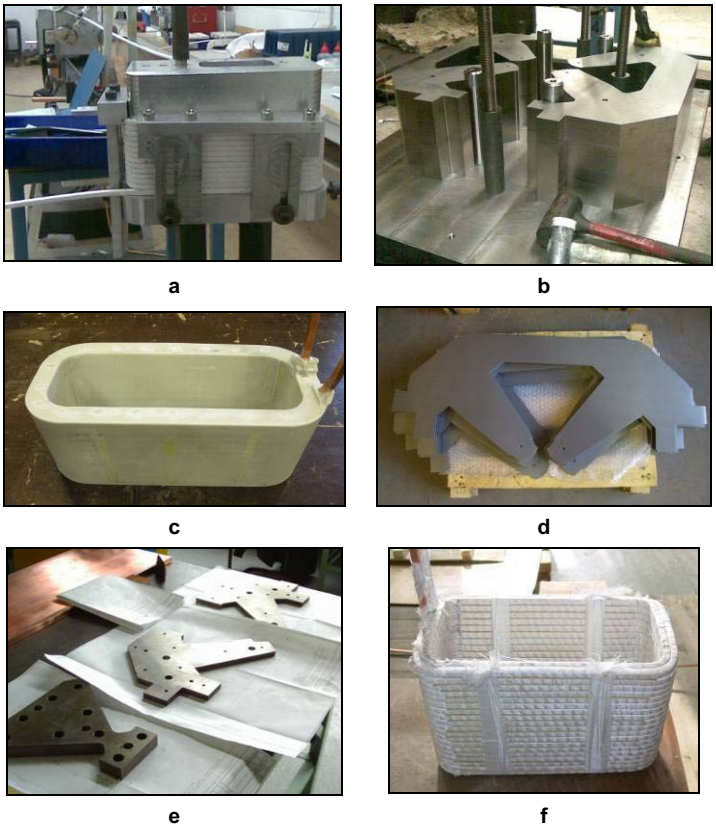


Figure 1. Magnet yoke and coil production: Buckley (a, b), Danfysik (c), Everson Tesla (d), and Budker Institute (e, f).

Table A. Storage Ring Magnets – Delivery of First Articles

Vendor	Magnet Type	Planned	Expected
Everson Tesla	68mm ap. Q	6/30/10	7/19/10
Budker Institute of Nuclear Physics	68mm ap. Q	6/15/10	7/15/10
Everson Tesla	Correctors	6/22/10	7/21/10
Danfysik	68mm ap. S	5/15/10	6/15/10
Inst. of HE Physics - Academica Sinica	68mm ap. S	4/1/10	5/20/10
Buckley Industries	90mm ap. Q; 76mm ap. S	5/30/10	6/15/10
Buckley Industries	Dipole	5/30/10	8/16/10

ap. = aperture Q = quadrupole S = sextupole HE = high energy

The first article of the magnet girders (Fig. 2) has been produced and will be delivered to BNL in early May.

Figure 2. First article of the girder at the factory before painting and shipping.

A prototype for the de-ionized cooling water system has been assembled (Fig. 3). After testing, this prototype system will be used to test RF equipment in Building 832 while production systems are assembled before being installed in the five service buildings.

The production of vacuum chambers starts to ramp up. Three additional S2O chambers were received from APS and detailed measurements were carried out by the Survey Group. Six S4 chambers were completed and are being tested at APS, and ten machined dipole extrusions are at APS ready for welding. Twenty dipole extrusions have arrived from the vendors. Design of the damping wiggler (DW) chambers began. A detailed thermal analysis of the chambers and downstream absorbers was carried out for the 15mm wiggler gap 100mm-period DW. The design of transfer line bending chambers has started.

Excellent progress was also made on other vacuum system components. First article BPM buttons have passed vacuum evaluation, and the prototype RF shield was successfully installed in the multipole chamber. Prototype RF shielded bellows were delivered to APS for beam tests. The first production batch of 32 ion pumps was received and successfully tested, with all pumps meeting the specifications.

Figure 3. Prototype de-ionized cooling water circuit for cooling NSLS-II magnets and absorbers, assembled at NSLS.

The control rack for the main dipole power supplies (PS) has been installed in the 902 high bay area for power tests. All PS controller boards are delivered and integration and testing have begun (Fig. 4). The layout of the two-channel regulator board for the corrector magnet PS is completed and the two prototype regulators for the fast corrector magnet PS and the corresponding power amplifiers have been tested on prototype air core corrector magnets. The design for the corrector PS interface card is completed. In house, we now have 1,190 DCCT modules (~ 60% of the total) for the power supplies.

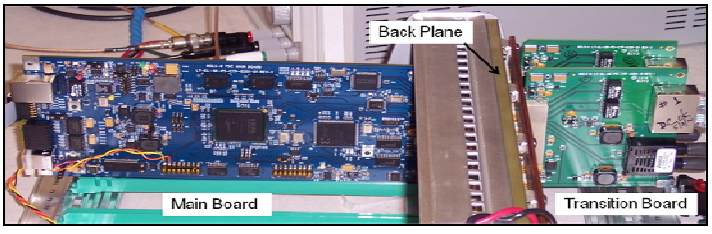


Figure 4. Controller board prototypes for multipole power supplies, for testing.

Good progress was made on the design of insertion devices (IDs) and setting up the ID measurement laboratory. The ANL group is in the final phase of testing the feasibility of shimming procedures for the fixed gap DW. Contracts for the integrated field measurement system and the insertion device clean room were awarded. A conceptual design for the

in-vacuum undulator with 22mm period length was completed for the SRX beamline. The design includes the array holder, magnet core, cooling platen crossover and manifold, gap drive assembly and feed-thru, vacuum and thermal transitions, kinematic differential adjusters, thermal shielding, gap drive train and control scheme, as well as the integration of the in-vacuum measurement system. For the IXS beamline, a cryogenic in-vacuum undulator is being considered as an option. Power density distribution and thermal analysis for the elliptical polarized undulator EPU49 in different polarization modes have been performed. The prototype BPM receiver card was successfully tested, meeting an important milestone for the in-house BPM development effort.

EXPERIMENTAL FACILITIES DIVISION (XFD)

The NSLS-II Experimental Facilities Division continued to make a good progress on preliminary designs for the six project beamlines. Preliminary design reports for all six beamlines are scheduled to be completed by the end of September 2010. An example of a beamline design is shown in Fig. 5, for the Coherent Hard X-ray Scattering beamline.

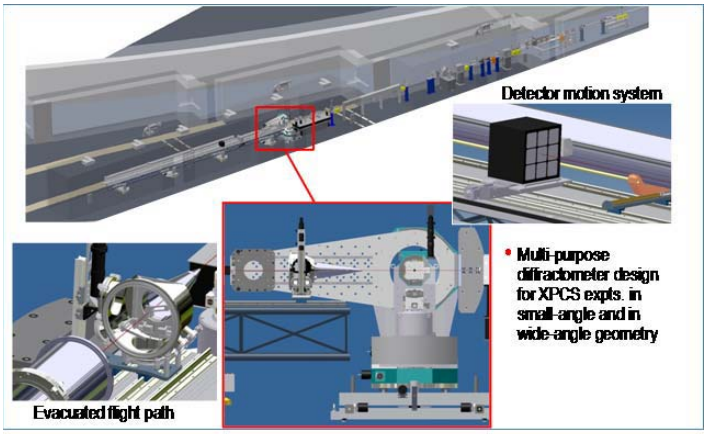


Figure 5. Illustration of preliminary design of an endstation instrument for the Coherent Hard X-ray Scattering (CHX) beamline.

Two workshops were held in April, one on scientific computing and the other on data acquisition and user interface. Participants included experts from the European Radiation Synchrotron Facility, Advanced Photon Source at Argonne, Linac Coherent Light Source at Stanford, Spallation Neutron Source at Oak Ridge National Lab, Diamond Light Source in the UK, and Riso National Laboratory in Denmark, among others. These workshops provided helpful lessons learned by other facilities and useful input for future planning in these important areas of support for user science.

In support of the call for beamline development proposals issued in March, a beamline development website has been set up to provide up-to-date information about NSLS-II to scientific user groups. In addition, an informational meeting was held for the beamline community on April 14. At the deadline for Letters of Intent (LOI) on April 26, fifty-seven LOIs had been received.

CONVENTIONAL FACILITIES DIVISION (CFD)

The pace of construction continued to accelerate in April, with the most notable progress being the continued placement of concrete and erection of steel. There were 3,854 cubic yards (CY) of concrete placed in April, more than any other month to date and 1,727 CY more than scheduled for April. With this work ahead of schedule, other activities can start earlier than planned. The storage ring (SR) walls were completed almost to the end of pentant 4. This enabled work on the SR tunnel roof (mezzanine) to proceed through the middle of pentant 4. Additional concrete was poured for service building 3 foundations and the start of foundations for service building 4. Footings for pentant 5 also were poured in April. Structural steel erection is approximately 1 month ahead of schedule.

April accomplishments included completion of structural steel for pentant 1 of the Ring Building and most of pentant 2, and the installation of curved roof joists (Fig. 6) for those pentant sections. The installation of roof decking was completed on the RF building, service building 1, and Ring Building pentant 1 (Fig. 7).

Figure 6. Curved roof joists for the Ring Building.

Figure 7. Structural steel and roof decking for Ring Building pentant 1, RF bldg, and service bldg 1 are near completion.

April saw the start of construction of steam manholes, which are poured-in-place concrete structures (Fig. 8). With these done, installation of steam and condensate piping begins in earnest. Chilled water piping was installed and tested in the vehicle tunnel. Chilled water lines are now being installed in the inner courtyard, moving south counter-clockwise from the vehicle tunnel. Electrical ductbank installation continues, with services being run to the buildings in the inner courtyard. Temporary electrical service was installed for the southern part of the site. Work on the electrical substation expansion continues: the interior of Building 603 is being modified to accommodate the new switchgear, cabling, and conduit. The transformer yard is being prepped to receive the new 20 MVA transformer, scheduled for delivery in early July. The major outage needed to tie the new transformer into the utility grid is still scheduled for September.

Figure 8. Steam manhole 47D being installed as part of underground utility work in the Ring Building courtyard.

The chilled water plant expansion continues ahead of schedule. Steel erection is completed, the composite concrete decks are all in place, the roof is nearing completion, and the building enclosure is proceeding rapidly. Piping in the basement pipe tunnel is nearly finished, condenser water pumps have been mounted in position, and building equipment is beginning to be installed on the upper floors. Cooling tower cells were installed in April and the chillers are ready for delivery and installation. The chilled water piping contractor continued deliveries of pipe to the site in anticipation of starting construction in May. The contractor has submitted all shop drawings and ESH documents and received approval to begin installation.

ENVIRONMENT, SAFETY, AND HEALTH (ESH)

A collaborative assessment of the contractor's excavation program is ongoing with DOE through the Brookhaven Site Office, as part of a monthly programmatic assessment to examine all aspects of the contractor's ESH program.

A near-miss was identified at the Ring Building site when an excavation operation pulled up an empty underground electrical conduit intended for low-voltage signal cable. The conduit was one of six buried in the vicinity. Although the damaged conduit was empty, one of the others nearby contained two temporary 120V live circuits. Due to the proximity of the live circuit conduit to the damaged conduit, this event was categorized and reported in the Occurrence Reporting and Processing System (ORPS) as a Group 10(3) "near-miss," where no barrier or only one barrier prevents an event from having a reportable consequence. A causal analysis was conducted and corrective actions are being implemented.

A recordable injury occurred on April 22, 2010. A laborer was using a claw hammer to separate pieces of wood that were nailed together to form spacers used in pouring concrete. He swung the hammer and it slid off the form, hitting his leg and resulting in a cut that required four stitches. The worker returned to the job with no restrictions.

Three radiation monitors have been purchased and installed on the NSLS experimental floor for evaluation during calendar year 2010. These instruments are being connected to the local area network to permit online record-keeping and observation of their performance. The data collection and analysis are ongoing.

Supplementary shielding analyses for the linac/booster injection shutters, linac beam dumps, booster beam dump, injection, and extraction septa have been completed and are in an advanced stage of engineering design. The ratchet wall shielding and collimator shielding for six project beamlines have been designed and are ready for procurement. Radiation losses at the six diagnostic flags in the booster ring were calculated; supplementary shielding needs were determined.

FLUKA Monte Carlo simulations for the injection scrapers have been summarized, to determine the additional shielding required inside the storage ring. Copper and tungsten scrapers were compared for shielding requirements. FLUKA simulations for top-off injection have been completed and a document is being prepared. Based on the simulations, top-off injection interlock options have been determined.

A radiation safety workshop is planned for the last week in June. Radiation safety professionals from SSRL, ALS, and ESRF have been invited to participate.

PROCUREMENT ACTIVITIES

The linac contract was awarded on April 12, 2010. Booster proposal evaluations were completed in mid April. Final award of the booster contract is pending BNL and DOE approval; an announcement is anticipated in early May. The Laboratory–Office Building (LOB) solicitation closing date was April 6. Seven proposals were received; six were within projected cost estimates. Proposal evaluation is in progress, with award anticipated in late May.

RECENT HIRES

For the second year running, competitive fellowships under the auspices of the National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM) Program are enhancing the project's summertime staff. Four additional student assistants were welcomed for the summer, and a new research associate joined the HXN beamline staff.

Daejin Eom – Research Associate, HXN Beamline, XFD
Irish Britt – GEM Fellow, Business Systems Dev, PSD
Darron Brumsey – GEM Fellow, HXN Beamline, XFD
Shana Collins – GEM Fellow, Controls, ASD
Bruce Davis – GEM Fellow, HXN Beamline, XFD
Samuel Fanfan – GEM Fellow, Diagnostics & Instrumentation, ASD
Niaja Farve – GEM Fellow, SRX Beamline, XFD
Tequisha Hendrickson – GEM Fellow, Civil/Struct. Eng., CFD
Joe Jackson – GEM Fellow, Civil/Struct. Eng., CFD
Rafael Lozano – GEM Fellow, Nanopositioning, XFD
Celest Okoli – GEM Fellow, Mechanical Engineering, ASD
Suchit Bhattarai – Student Assistant, Controls, ASD
Korey Hopkins – Student Assistant, Controls, ASD
Amber Liverpool – Student Assistant, Controls, ASD
Anita Quabili – Student Assistant, Controls, ASD

COST/SCHEDULE BASELINE STATUS

The cumulative Cost Performance Index (CPI) is 1.02 and the cumulative Schedule Performance Index (SPI) is 0.98, both well within the acceptable range.

Progress during April in all areas of the project was on schedule and on budget. The current-month CPI (0.71) and SPI (0.79) are due to either the timing of invoice payments being out of phase from the actual period of work completed (e.g., Title II design for LOB, SR Magnets) or planned work in April being already performed in March (e.g., Ring Building and CCWF contracts). There are no cost and schedule impacts or issues.

With the Ring Building construction ahead of schedule, the critical path for the project has shifted from conventional construction of the Ring Building to a path through accelerator vacuum chamber welding, girder integration and survey and alignment, then through accelerator installation, testing, and commissioning (see milestone schedule on p. 7). The Ring Building construction is off the critical path by 37 days of schedule float. The booster and linac fabrication delivery schedules are each about 1–2 months off the critical path. The projected early completion date has not changed and remains February 2014—a full 16 months prior to the CD-4 milestone, the project completion date of June 2015.

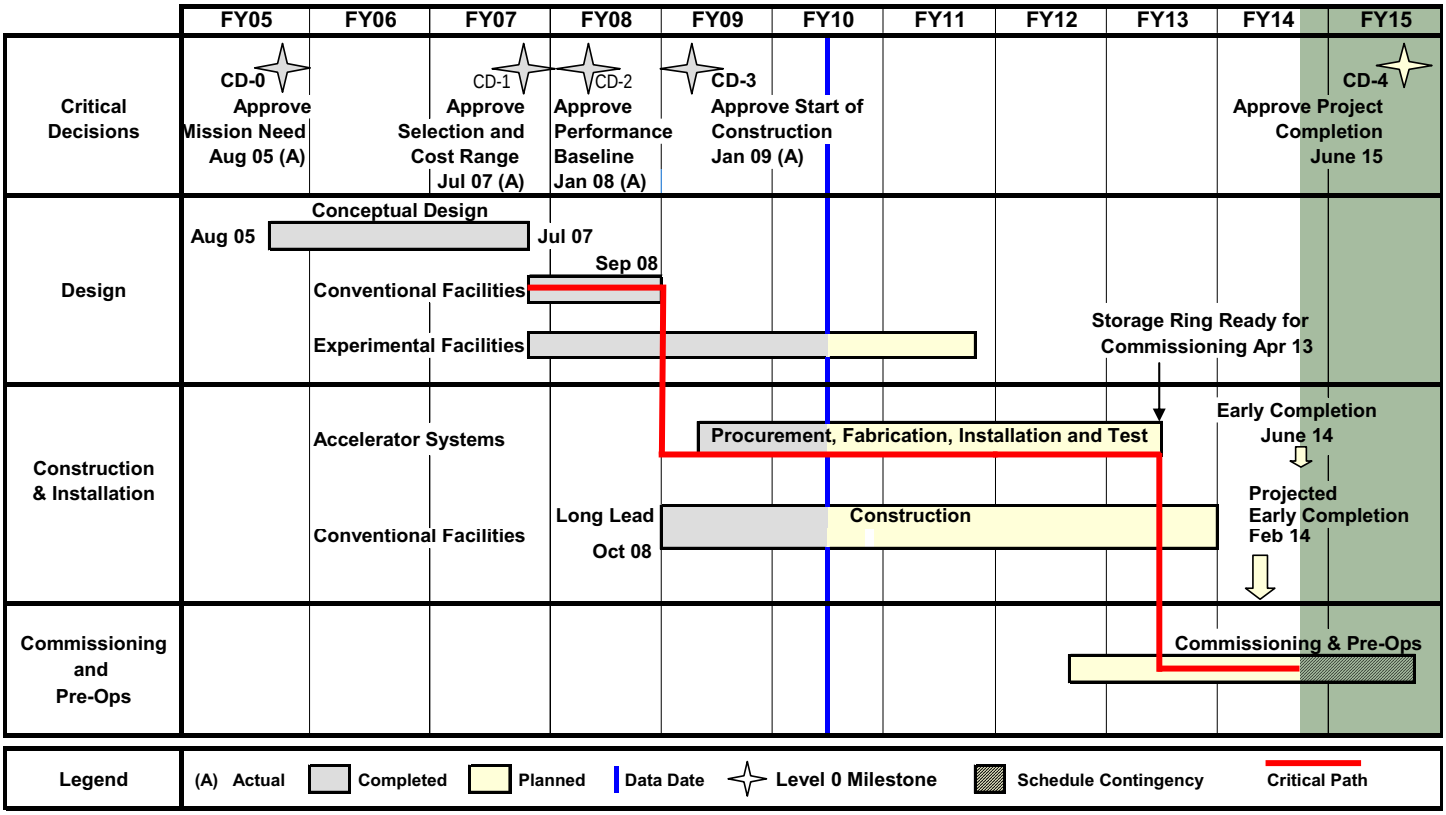
RECENT PROJECT ACCOMPLISHMENTS

- Two successful workshops were held, on the topics of data acquisition/user interface and scientific computing.
- The SR tunnel roof and storage ring walls were completed through the middle of pentant 4. Structural steel erection is approximately 1 month ahead of schedule. The installation of roof decking was completed on the RF building, service building 1, and Ring Building pentant 1.
- Steel erection for the chilled water plan expansion project is completed.
- The linac contract was awarded and booster proposal evaluations were completed.
- The first article of the magnet girders has been produced and will be delivered in May.
- A prototype de-ionized cooling water system was assembled and is being tested.
- The production of vacuum chambers started to ramp up. A number of production chambers were delivered and tested.
- The first shipment of 32 ion pumps for vacuum system was received and all met specs.
- The prototype BPM receiver card was successfully tested and is ready for a beam test.

PROJECT DESCRIPTION

The NSLS-II project is being carried out to design and build a world-class user facility for scientific research using synchrotron radiation. The project scope includes the design, construction, and installation of the accelerator hardware, civil construction, and experimental facilities required to produce a new synchrotron light source. It will be highly optimized to deliver ultra-high brightness and flux and exceptional beam stability. These capabilities will enable the study of material properties and functions down to a spatial resolution of 1 nm, energy resolution of 0.1 meV, and with the ultra-high sensitivity necessary to perform spectroscopy on a single atom.

DOE Project Milestone Schedule



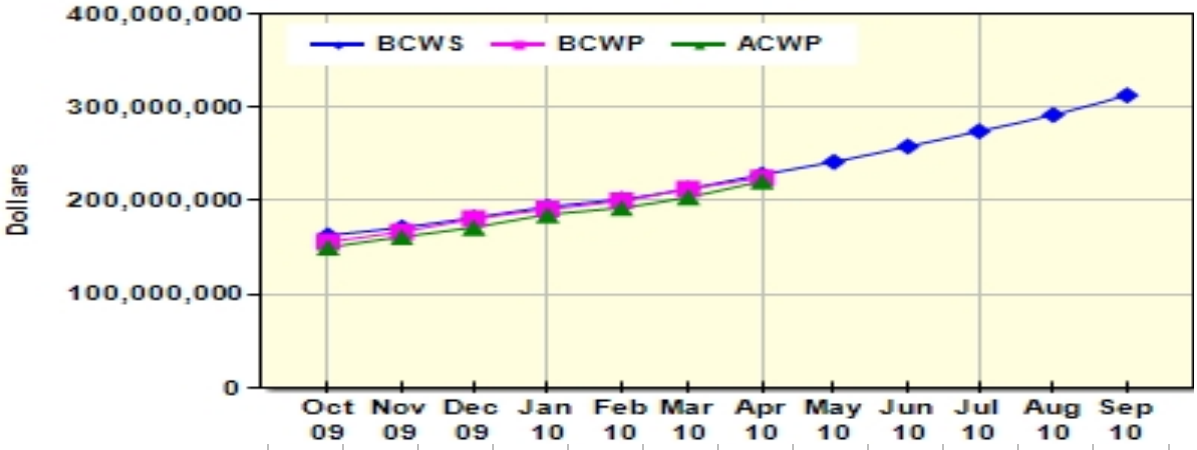
Funding Profile

	NSLS-II Funding Profile ($M)											
Fiscal Year	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	TOTAL
R&D			3.0	20.0	10.0	2.0	0.8					35.8
OPC	1.0	4.8	19.0									24.8
PED			3.0	29.7	27.3							60.0
Construction					216.0	139.0	151.6	151.4	46.9	26.3		731.2
Pre-Ops							0.7	7.7	24.4	22.4	5.0	60.2
Total NSLS-II Project	1.0	4.8	25.0	49.7	253.3	141.0	153.1	159.1	71.3	48.7	5.0	912.0

Key Personnel

Title	Name	Email	Phone
Federal Project Director	Frank Crescenzo	crescenzo@bnl.gov	631-344-3433
NSLS-II Project Director	Steve Dierker	dierker@bnl.gov	631-344-4966

EV for WBS 1 (NSLS-II Project) as of April 30, 2010



Cumulative to Date (K$)	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10	Aug 10	Sep 10
BCWS	162,854	171,323	181,553	193,298	201,337	212,530	227,854	241,400	257,870	274,117	291,707	312,558
BCWP	155,908	166,818	180,426	190,699	199,953	212,325	224,378					
ACWP	150,173	161,209	171,370	184,693	192,382	203,749	220,833					

Project as of 4/30/10	Current Period	Cum-to-date
Plan (BCWS) $K	15,324	227,854
Earned (BCWP) $K	12,053	224,378
Actual (ACWP) $K	17,084	220,833
SV $K	-3,271	-3,476
CV $K	-5,031	3,545
SPI	0.79	0.98
CPI	0.71	1.02
Budget at Completion $K (PMB (UB))		762,610
Planned % Complete		29.9%
Earned % Complete		29.4%
Mgmt Reserve/Cont as % of BAC remaining		27.8%
Mgmt Reserve/Cont as % of EAC remaining		26.1%

The IPT can find further details on NSLS-II cost and schedule data at http://www.bnl.gov/nsls2/project/IPT/default.asp.

Milestones – Near Term	Baseline	Done
L3-Begin Ring Building Steel Erection	09/14/09	✓
L3-External Tech. review of concept. design for project BLs done	11/16/09	✓
L3-Clean Room contract awarded	12/30/09	✓
L3-Linac contract awarded	2/05/10	✓
L3-APS Welding S2 ODD – first chamber ready for assembly	3/17/10	✓
L3-Pentant 1 structural steel erected	3/31/10	✓
L3-Initial test of new MLL deposition system completed	6/30/10	
L3-LOB construction contract awarded	7/01/10	
L3-LOB construction Notice to Proceed (NTP) issued	7/01/10	
L3-SR Magnet – Quads First Article ready for integration	7/19/10	
L2-Pentant 2 structural steel erected	8/05/10	
L3-Safety review of preliminary designs for project BLs completed	8/30/10	
L2-BAT Reviews of 100% prelim. designs for project BLs completed	9/15/10	

L3 = Level 3 Milestone, L2 = Level 2

Schedule Performance Index, Project to Date:

SPI **0.98**

Cause & Impact: No reportable variance.
Corrective Action: None Required.

Cost Performance Index, Project to Date:

CPI **1.02**

Cause & Impact: No reportable variance.
Corrective Action: None Required.

ACWP = Actual Cost of Work Performed
BAC = Budget at Completion
BCWP = Budgeted Cost of Work Performed
BCWS = Budgeted Cost of Work Scheduled
CPI = Cost Performance Index (BCWP/ACWP)
EV = Earned Value
IPT = Integrated Project Team
PMB = Performance Measurement Baseline
SPI = Schedule Performance Index
WBS = Work Breakdown Structure

SPI or CPI in the range of:	
	0.9 – 1.15 is green
	0.85 – 0.89 or 1.16 – 1.25 is yellow
	<0.85 or >1.25 is red

Three PCRs were approved in April:

PCR #	Area	Δcost	Title or Description
10_133	ASD	161K	SR Magnet Contract Update
10_140	ASD	$N/A	IVMMS Procurement
10_145	ASD	$N/A	Re-phasing SR P/S Controls Equipment

ARRA DETAILS

This Recovery Act project will provide advanced funding for NSLS-II construction, create jobs, and substantially reduce the cost and schedule risks for the project. The overall schedule for the Ring Building completion will not be accelerated; however, Recovery Act funds allow for re-ordering of the work sequence with a six-month acceleration of the injection building completion. Acceleration of the injection building allows for earlier installation and commissioning of the injector, which had been close to critical path. This addition of schedule float will significantly reduce the schedule risk for the accelerator. In addition, Recovery Act funds will accelerate completion of the Laboratory Office Buildings by 15 months, which will enable the project to maximize the cost advantage of the depressed construction market.

ARRA$ as of 4/30/10	Current Period	Cum-to-date
Plan (BCWS) $K	8,200	47,284
Earned (BCWP) $K	3,463	48,180
Actual (ACWP) $K	3,614	45,187
SV $K	-4,738	896
CV $K	-151	2,993

ARRA Milestones		
Description	Baseline Date	Status
BNL review and approval of heat exchangers (HX).	7/31/09	Completed 3/31/10.
Fabricate concrete embeds, Phase 3.	8/26/09	Completed. All embeds had been delivered by 11/5/09.
Install ductbank storm pump station to HH44, HH3.	9/2/09	Completed 4//30/10.
Pour concrete walls for vehicle tunnel.	9/10/09	Completed 9/24/09.
Pour cooling tower walls and piers.	9/22/09	Completed 1/14/10.
Pour tunnel walls at Ratchet 23A.	10/5/09	Completed 10/16/09.
Start chilled water concrete foundations.	10/7/09	Completed.
Install manhole G6C.	10/13/09	Completed 12/4/09.
Pour tunnel slab CL 120-006.	10/20/09	Completed 9/29/09.
Pour tunnel slab CL 006-012.	10/20/09	Completed 10/7/09.
Backfill utility tunnel and vehicle tunnel.	10/27/09	Completed 4/27/10.
Install manholes G6 and G6A.	11/11/09	Completed 11/18/09.
Pour tunnel slab CL 012-018.	11/24/09	Completed 10/15/09.
Pentant 1 tunnel walls complete.	11/19/09	Completed 11/11/09.
Pour tunnel walls at ratchet 28A.	12/03/09	Completed 11/11/09.
Install sanitary UG piping SB3 footings.	12/08/09	Completed 12/10/09.
Pour tunnel slab CL 018-024.	12/14/09	Completed 11/02/09.
Excavate booster svc bldg. foundations.	12/24/09	Completed 10/7/09.
Pour tunnel slab CL 024-030.	12/30/09	Completed 11/25/09.
Begin concrete tunnel roof pentant 1.	12/10/09	Completed 11/12/09.
Complete tunnel slab pentant 2.	1/15/10	Completed 1/15/10.
Pentant 2 tunnel walls complete.	3/16/10	Completed 3/11/10.
Begin steel erection pentant 1.	4/14/10	Completed 3/16/10.
Start metal decking for pentant 1 Service Building.	5/12/10	Completed 4/14/10.

Blue text indicates new or revised text since last month's report.

CLASSIFICATION (When Filled In)

CONTRACT PERFORMANCE REPORT
FORMAT 1 - WORK BREAKDOWN STRUCTURE

FORM APPROVED
OMB No. 0704-0188

1. CONTRACTOR	2. CONTRACT		3. PROGRAM	4. REPORT PERIOD
a. NAME Brookhaven Science Associates	a. NAME NSLS-II - ARRA		a. NAME April 2010 EV8	a. FROM (YYYYMMDD) 2010 / 04 / 01
b. LOCATION (Address and ZIP Code) Brookhaven National Laboratory, Upton,NY	b. NUMBER		b. PHASE	b. TO (YYYYMMDD) 2010 / 04 / 30
	c. TYPE	d. SHARE RATIO	c. EVMS ACCEPTANCE NO YES X (YYYYMMDD)	

8. PERFORMANCE DATA

ARRA Cost Account / ITEM (1)	CURRENT PERIOD BUDGETED COST WORK SCHEDULED (2)	CURRENT PERIOD BUDGETED COST WORK PERFORMED (3)	CURRENT PERIOD ACTUAL COST WORK PERFORMED (4)	CURRENT PERIOD VARIANCE SCHEDULE (5)	CURRENT PERIOD VARIANCE COST (6)	CUMULATIVE TO DATE BUDGETED COST WORK SCHEDULED (7)	CUMULATIVE TO DATE BUDGETED COST WORK PERFORMED (8)	CUMULATIVE TO DATE ACTUAL COST WORK PERFORMED (9)	CUMULATIVE TO DATE VARIANCE SCHEDULE (10)	CUMULATIVE TO DATE VARIANCE COST (11)	AT COMPLETION BUDGETED (14)	AT COMPLETION ESTIMATED (15)	AT COMPLETION VARIANCE (16)
A ARRA													
1.05.03.02.01 General Requirements	0	0	0	0	0	4,727,694	4,730,269	2,729,466	2,575	2,000,803	4,851,187		
1.05.03.02.02 Site Work	0	0	0	0	0	3,089,062	2,774,882	2,568,215	-314,180	206,667	3,533,893		
1.05.03.02.03 Pentant 1 and Service Building	415,114	632,005	788,081	216,891	-156,076	6,484,184	7,020,637	7,055,628	536,453	-34,991	18,563,024		
1.05.03.02.04 Pentant 2 and Service Building	41,113	364,586	465,548	323,473	-100,962	5,863,040	6,288,093	6,381,466	425,053	-93,372	15,132,461		
1.05.03.02.05 Pentant 3 and Service Building	1,741,299	682,882	576,392	-1,058,417	106,490	4,629,790	4,823,476	4,796,380	193,686	27,096	9,823,908		
1.05.03.02.06 Pentant 4 and Service Building	0	106,491	0	106,491	106,491	772,680	984,620	969,538	211,940	15,082	2,170,707		
1.05.03.02.07 Pentant 5 and Service Building	0	446,937	436,286	446,937	10,651	2,952,113	3,267,007	3,172,740	314,894	94,267	6,812,987		
1.05.03.02.08 Injection Building	19,600	24,391	24,391	4,791	0	762,255	561,764	744,464	-200,491	-182,700	5,337,009		
1.05.03.02.09 RF and Compressor Building	-297,043	-285,561	19,326	11,482	-304,887	1,298,943	1,286,999	1,363,680	-11,944	-76,681	4,453,017		
1.05.03.02.10 Lobby	0	0	0	0	0	105,589	167,234	164,854	61,645	2,380	2,987,094		
1.05.03.02.11 Cooling Tower and Process Water	39,165	81,492	81,492	42,327	-1	160,408	277,566	270,806	117,158	6,760	4,075,953		
1.05.03.02.12 Underground Mechanical Utilities	3,020,932	342,401	342,400	-2,678,531	1	3,760,381	4,318,957	4,245,237	558,576	73,720	8,478,155		
1.05.03.02.13 Site Electrical Utilities	978,561	378,732	378,830	-599,829	-98	6,034,037	6,155,416	6,025,913	121,380	129,504	9,356,456		
1.05.03.02.14 LN2 and GN2 Systems	0	0	0	0	0	0	0	0	0	0	0		
1.05.03.03 Electrical Substation and Feeder (Contract)	229,216	273,984	381,520	44,769	-107,535	1,863,436	1,581,947	1,420,170	-281,489	161,777	2,943,143		
1.05.03.04 Chilled Water Plant (Conract)	1,959,416	414,352	119,297	-1,545,065	295,054	4,693,926	3,941,622	3,278,873	-752,304	662,749	9,200,000		
1.05.03.06.01 LOB 1	0	0	0	0	0	0	0	0	0	0	9,817,013		
1.05.03.06.02 LOB 5	0	0	0	0	0	0	0	0	0	0	9,817,018		
1.05.03.06.03 LOB 4	0	0	0	0	0	0	0	0	0	0	5,273,022		
1.05.03.07.01 HXN Sattelite Building Design	52,843	0	0	-52,843	0	86,667	0	0	-86,667	0	300,000		
1.05.03.07.02 HXN Satellite Building Construction	0	0	0	0	0	0	0	0	0	0	1,264,573		
1.05.04 Integrated Controls & Communications	0	0	0	0	0	0	0	0	0	0	0		
ARRA Sub total	**8,200,216**	**3,462,691**	**3,613,563**	**-4,737,525**	**-150,872**	**47,284,205**	**48,180,489**	**45,187,428**	**896,284**	**2,993,061**	**134,190,620**		
Undist. Budget											**4,186,141**		
ARRA Total	**8,200,216**	**3,462,691**	**3,613,563**	**-4,737,525**	**-150,872**	**47,284,205**	**48,180,489**	**45,187,428**	**896,284**	**2,993,061**	**138,376,761**		

CLASSIFICATION (When Filled In)

CONTRACT PERFORMANCE REPORT
FORMAT 1 - WORK BREAKDOWN STRUCTURE

FORM APPROVED
OMB No. 0704-0188

1. CONTRACTOR	2. CONTRACT	3. PROGRAM	4. REPORT PERIOD
a. NAME Brookhaven Science Associates	a. NAME NSLS-II	a. NAME NSLS-II March 2010	a. FROM (YYYYMMDD) 2010 / 04 / 01
b. LOCATION (Address and ZIP Code) Brookhaven National Laboratory, Upton,NY	b. NUMBER	b. PHASE	b. TO (YYYYMMDD) 2010 / 04 / 30
	c. TYPE / d. SHARE RATIO	c. EVMS ACCEPTANCE NO YES X (YYYYMMDD)	

5. CONTRACT DATA

a. QUANTITY	b. NEGOTIATED COST	c. ESTIMATED COST OF AUTHORIZED UNPRICED WORK	d. TARGET PROFIT/ FEE	e. TARGET PRICE	f. ESTIMATED PRICE	g. CONTRACT CEILING	i. DATE OF OTB/OTS (YYYYMMDD)
1	912,000,000	0	0	912,000,000	0	0	

6. PERFORMANCE DATA

WBS[2] / WBS[3] / Control Acct / ITEM (1)	CURRENT PERIOD: BUDGETED COST WORK SCHEDULED (2)	BUDGETED COST WORK PERFORMED (3)	ACTUAL COST WORK PERFORMED (4)	VARIANCE SCHEDULE (5)	VARIANCE COST (6)	CUMULATIVE TO DATE: BUDGETED COST WORK SCHEDULED (7)	BUDGETED COST WORK PERFORMED (8)	ACTUAL COST WORK PERFORMED (9)	VARIANCE SCHEDULE (10)	VARIANCE COST (11)	AT COMPLETION: BUDGETED (14)	ESTIMATED (15)	VARIANCE (16)
1.01 Project Management													
1.01.01 Project Management													
WBS[3]Totals:	148,155	148,155	608,851	0	-460,696	3,463,433	3,463,433	3,633,013	0	-169,580	7,445,412	7,503,242	-57,831
1.01.02 Environmental, Safety & Health													
WBS[3]Totals:	125,131	125,131	102,159	0	22,972	2,297,584	2,297,584	2,635,382	0	-337,799	6,662,820	6,585,003	77,817
1.01.03 Project Support													
WBS[3]Totals:	716,988	716,988	884,987	0	-167,999	18,665,648	18,665,648	19,701,632	-0	-1,035,984	37,878,194	41,990,401	-4,112,208
1.01.04 Quality Assurance													
WBS[3]Totals:	54,167	54,167	56,220	0	-2,054	1,385,944	1,385,944	1,025,107	0	360,837	3,073,212	3,073,212	0
1.01.05 Configuration Management & Document Contro													
WBS[3]Totals:	28,223	28,223	28,154	0	69	833,885	833,885	659,104	0	174,781	1,972,567	1,972,567	0
WBS[2]Totals:	**1,072,663**	**1,072,663**	**1,680,371**	**0**	**-607,707**	**26,646,494**	**26,646,494**	**27,654,239**	**-0**	**-1,007,745**	**57,032,204**	**61,124,425**	**-4,092,221**
1.02 R&D and Conceptual Design													
1.02.01 Accelerator Systems R&D													
WBS[3]Totals:	118,079	57,347	8,649	-60,733	48,698	10,259,173	9,436,325	9,330,669	-822,848	105,656	11,460,076	11,460,076	-0
1.02.02 Experimental Systems R&D													
WBS[3]Totals:	204,532	345,301	276,329	140,769	68,973	13,032,856	12,827,905	11,928,952	-204,951	898,954	19,166,550	19,163,545	3,005
1.02.03 Conceptual Design - Accelerator Systems													
WBS[3]Totals:	0	0	0	0	0	12,998,214	12,998,214	12,960,504	0	37,709	12,998,214	12,998,214	0
1.02.04 Conceptual Design - Experimental Facilities													
WBS[3]Totals:	0	0	0	0	0	709,445	709,445	712,450	0	-3,005	709,445	712,450	-3,005
1.02.05 Conceptual Design - Conventional Facilities													
WBS[3]Totals:	0	0	0	0	0	3,886,952	3,886,952	3,872,878	0	14,074	3,886,952	3,886,952	0
1.02.06 Conceptual Design - Project Management & Suppor													
WBS[3]Totals:	0	0	0	0	0	7,086,188	7,086,188	7,325,314	0	-239,126	7,086,188	7,325,314	-239,126
1.02.07 Project Management - R&D													
WBS[3]Totals:	35,352	35,352	180,557	0	-145,205	4,915,337	4,915,337	4,996,034	0	-80,697	5,305,339	5,066,213	239,126
WBS[2]Totals:	**357,964**	**438,000**	**465,534**	**80,037**	**-27,534**	**52,888,165**	**51,850,366**	**51,126,800**	**-1,027,799**	**733,566**	**60,612,763**	**60,612,763**	**1**
1.03 Accelerator Systems													
1.03.01 Accelerator Systems Management													
WBS[3]Totals:	94,418	94,418	154,345	0	-59,927	2,809,360	2,809,360	2,927,334	0	-117,975	6,019,099	6,019,099	0
1.03.02 Accelerator Physics													
WBS[3]Totals:	230,007	230,007	257,321	0	-27,313	4,276,063	4,276,063	3,828,806	0	447,257	10,071,767	10,071,767	0
1.03.03 Injection System													
WBS[3]Totals:	380,243	225,810	658,443	-154,433	-432,633	3,856,150	2,973,087	2,669,175	-883,063	303,912	42,691,324	42,691,324	0
1.03.04 Storage Ring													
WBS[3]Totals:	1,798,240	2,123,146	3,710,306	324,907	-1,587,159	26,800,460	23,854,011	24,261,102	-2,946,449	-407,091	148,615,851	153,229,879	-4,614,028
1.03.05 Controls Systems													
WBS[3]Totals:	345,696	314,343	371,775	-31,352	-57,432	5,735,103	4,571,644	4,700,954	-1,163,460	-129,310	20,207,065	20,207,065	0
1.03.06 Accelerator Safety Systems													
WBS[3]Totals:	53,461	8,156	66,537	-45,304	-58,381	1,157,697	812,240	864,126	-345,457	-51,886	4,471,232	4,915,544	-444,312
1.03.07 Insertion Devices													
WBS[3]Totals:	28,234	26,010	91,525	-2,223	-65,515	1,577,924	1,122,745	749,412	-455,178	373,334	24,613,697	26,363,698	-1,750,000
1.03.08 Accelerator Fabrication Facilities													
WBS[3]Totals:	93,396	94,563	153,412	1,167	-58,849	6,013,170	4,588,416	4,557,196	-1,424,753	31,220	6,961,411	6,961,411	0
WBS[2]Totals:	**3,023,694**	**3,116,454**	**5,463,864**	**92,760**	**-2,347,210**	**52,225,926**	**45,007,565**	**44,558,105**	**-7,218,361**	**449,461**	**263,651,447**	**270,459,787**	**-6,808,340**
1.04 Experimental Facilities													
1.04.01 Experimental Facilities Management													
WBS[3]Totals:	108,829	108,829	133,030	0	-24,201	2,281,184	2,281,184	2,629,946	0	-348,761	4,828,335	6,376,107	-1,547,771
1.04.02 Standard Local Controls & Data Acquisition Systems													
WBS[3]Totals:	0	0	0	0	0	21,887	28,876	0	6,989	28,876	69,585	69,585	0
1.04.05 User Instruments													
WBS[3]Totals:	267,145	213,761	367,304	-53,384	-153,543	4,751,029	4,614,224	3,712,225	-136,805	902,000	62,008,511	63,164,172	-1,155,661
1.04.06 Front End User Requirements Development													
WBS[3]Totals:	0	0	-1,004	0	1,004	456	456	1,099	-0	-643	456	2,103	-1,647
1.04.07 Optics Labs													
WBS[3]Totals:	0	0	29,150	0	-29,150	843,917	645,243	599,775	-198,674	45,468	2,072,162	1,960,440	111,722
WBS[2]Totals:	**375,973**	**322,589**	**528,480**	**-53,384**	**-205,891**	**7,898,474**	**7,569,984**	**6,943,045**	**-328,490**	**626,939**	**68,979,050**	**71,572,407**	**-2,593,357**
1.05 Conventional Facilities													
1.05.01 Conventional Facilities Management													
WBS[3]Totals:	242,407	242,407	321,289	0	-78,883	5,828,251	5,828,251	5,872,339	0	-44,087	14,187,003	14,223,591	-36,588
1.05.02 Conventional Facilities Engineering and Design													
WBS[3]Totals:	112,049	80,403	1,955,383	-31,647	-1,874,981	19,009,525	18,877,874	17,815,309	-131,651	1,062,565	22,563,410	22,563,410	0
1.05.03 Conventional Facilities Construction													
WBS[3]Totals:	10,124,797	6,780,149	6,666,538	-3,344,648	113,611	63,144,621	68,528,871	66,808,536	5,384,250	1,720,335	219,032,782	243,173,411	-24,140,629
1.05.04 Integrated Controls & Communications													
1.05.04 Integrated Controls & Communications	0	0	0	0	0	139,236	13,539	13,594	-125,697	-55	561,273	961,000	-399,727
WBS[3]Totals:	0	0	0	0	0	139,236	13,539	13,594	-125,697	-55	561,273	961,000	-399,727
1.05.05 Standard Equipment													
1.05.05 Standard Equipment	0	0	0	0	0	0	0	0	0	0	1,025,586	1,025,586	0
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	1,025,586	1,025,586	0
1.05.06 Conventional Facilities Commissioning													
1.05.06 Commissioning	14,146	0	2,367	-14,146	-2,367	73,451	45,000	41,049	-28,451	3,951	578,000	578,000	-0
WBS[3]Totals:	14,146	0	2,367	-14,146	-2,367	73,451	45,000	41,049	-28,451	3,951	578,000	578,000	-0
WBS[2]Totals:	**10,493,399**	**7,102,958**	**8,945,578**	**-3,390,441**	**-1,842,620**	**88,195,085**	**93,293,536**	**90,550,828**	**5,098,452**	**2,742,709**	**257,948,054**	**282,524,998**	**-24,576,944**
1.06 Pre-Operations													
1.06.01 Management - Pre Ops													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	20,170,700	20,170,700	0
1.06.02 Accelerator Systems - Pre Ops													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	17,071,591	17,071,591	0
1.06.03 Experimental Facilities - Pre Ops													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	3,823,660	4,310,560	-486,900
1.06.04 Spares													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	9,134,454	9,134,454	0
WBS[2]Totals:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**50,200,405**	**50,687,305**	**-486,900**
Performance Measurement Baseline - PMB	15,323,693	12,052,665	17,083,627	-3,271,028	-5,030,963	227,854,143	224,377,945	220,833,016	-3,476,198	3,544,929	758,423,924	796,981,685	-38,557,762
Undistributed Budget											4,186,141	0	4,186,141
Sub Total	15,323,693	12,052,665	17,083,627	-3,271,028	-5,030,963	227,854,143	224,377,945	220,833,016	-3,476,198	3,544,929	762,610,065	796,981,685	-34,371,621
Contingency/Mangement Reserve											149,389,935		
Total Project Cost -TPC	15,323,693	12,052,665	17,083,627	-3,271,028	-5,030,963	227,854,143	224,377,945	220,833,016	-3,476,198	3,544,929	912,000,000		